

comprising:

forming a gate structure on a substrate, the gate structure having a capping layer thereon;

forming a source/drain with a shallow-junction in the substrate beside the gate structure;

forming a spacer on sidewalls of the gate structure; and

forming an elevated SiGe source/drain layer on the source/drain with a shallow junction.

- [c11] 11. The method of claim 10, wherein forming the elevated SiGe source/drain layer comprises performing rapid thermal chemical vapor deposition (RTCVD) to form the elevated source/drain layer.
- [c12] 12. The method of claim 11, wherein the RTCVD uses a reaction gas comprising Si_2H_6 / GeH_4 mixture gas or SiH_2Cl_2 / GeH_4 mixture gas.
- [c13] 13. The method of claim 11, wherein the RTCVD is conducted under 1~20 Torr and 500 ° C.
- [c14] 14. The method of claim 10, wherein a thickness of the elevated SiGe source/drain layer is 200~500 Å .
- [c15] 15. The method of claim 10, further comprising performing an implantation to dope the elevated SiGe source/drain layer.
- [c16] 16. The method of claim 10, further comprising forming a metal silicide layer on the elevated SiGe source/drain layer.
- [c17] 17. The method of claim 16, wherein the metal silicide layer comprises cobalt silicide (CoSi_x) or nickel silicide (NiSi_x).
- [c18] 18. The method of claim 10, wherein an implanting energy for forming the source/drain with a shallow junction is 2~3 KeV.
- [c19] 19. The method of claim 10, wherein the capping layer and the spacer comprise the same material.
- [c20] 20. The method of claim 19, wherein the capping layer and the spacer both

comprise silicon nitride.

- [c21] 21. A method for fabricating a raised source/drain of a semiconductor device, comprising:
- forming a gate structure on a substrate, the gate structure having a capping layer thereon;
 - forming a source/drain with a shallow-junction in the substrate beside the gate structure;
 - forming a spacer on sidewalls of the gate structure;
 - forming an elevated SiGe source/drain layer on the source/drain with a shallow junction;
 - removing the capping layer; and
 - forming a metal silicide layer on the gate structure and the elevated SiGe source/drain layer.
- [c22] 22. The method of claim 21, wherein forming the elevated SiGe source/drain layer comprises performing rapid thermal chemical vapor deposition (RTCVD) to form the elevated source/drain layer.
- [c23] 23. The method of claim 22, wherein the RTCVD uses a reaction gas comprising Si_2H_6 / GeH_4 mixture gas or SiH_2Cl_2 / GeH_4 mixture gas.
- [c24] 24. The method of claim 22, wherein the RTCVD is conducted under 1~20 Torr and 500 ° C.
- [c25] 25. The method of claim 21, wherein a thickness of the elevated SiGe source/drain layer is 200~500 Å .
- [c26] 26. The method of claim 21, further comprising performing an implantation to dope the elevated SiGe source/drain layer.
- [c27] 27. The method of claim 21, wherein the metal silicide layer comprises cobalt silicide (CoSi_x) or nickel silicide (NiSi_x).
- [c28] 28. The method of claim 21, wherein an implanting energy for forming the source/drain with a shallow junction is 2~3 KeV.

- [c29] 29. The method of claim 21, wherein the capping layer and the spacer comprise different materials.
- [c30] 30. The method of claim 29, wherein the capping layer comprises silicon oxide and the spacer comprise silicon nitride.